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In re Application of:	
Jeong-Min MOON	Confirmation No.: 8028
Application No.: 10/000,093	Group Art Unit: 2875
Filed: December 4, 2001	Examiner: G. Lee
For: FLAT TYPE FLUORESCENT LAMP	**Mail Stop AF**

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I, the below named translator, hereby declare that:

My name and post office address are as stated below;

That I am knowledgeable in the English language and in the Korean language and believe the attached English translation to be a true and complete translation of the document identified below.

The document for which the attached English translation is being submitted is Korean Patent Application No. 2000-74288 filed in Korea on December 7, 2000.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Signature of the translator: _____ Date: 2nd day of August, 2004

(Translation)

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This is to certify that the following application annexed hereto is a true copy from the records of the Korean Industrial Property Office.

Application Number : Patent Application 74288/2000

Date of Application : December 7, 2000

Applicant : LG. Philips LCD Co., Ltd.

Commissioner

[ABSTRACT]

A flat type fluorescent lamp having supporters between a first substrate and a light-scattering means is disclosed, which is for distributing quantity of light uniformly and obtaining high luminance. The flat type fluorescent lamp includes first and second substrates, a light-emitting layer formed between the first and second substrates, a plurality of supporters selectively attached on the first substrate, and a light-scattering means formed to have a predetermined distance from the first substrate by the supporters.

[TYPICAL DRAWING]

FIG. 4A

[INDEX]

flat surface type light-emitting, high luminance

[SPECIFICATION]

[TITLE OF THE INVENTION]

FLAT TYPE FLUORESCENT LAMP

[BRIEF DESCRIPTION OF THE DRAWINGS]

FIG. 1 is a sectional view of a related art flat type fluorescent lamp.

FIG. 2 is a sectional view illustrating problems of the related art flat type fluorescent lamp.

FIG. 3A to FIG. 3B are sectional views illustrating a flat type fluorescent lamp according to the present invention.

FIG. 4A to FIG. 4B are perspective views of the flat type fluorescent lamp according to the first embodiment of the present invention.

FIG. 5 illustrates supporters of the present invention.

FIG. 6A to FIG. 6b are sectional views of the supporters according to the present invention.

FIG. 7 illustrates a cap according to the present invention.

FIG. 8 is a perspective view illustrating a flat type fluorescent lamp according to the second embodiment of the present invention.

Description of reference numerals for main parts in the drawings

11: reflecting portion	12: light-emitting portion
13: supporter	14: light-diffusion portion
15: light-scattering means	16: first substrate
17: second substrate	18: cap
19: discharge gas	

[DETAILED DESCRIPTION OF THE INVENTION]

[OBJECT OF THE INVENTION]

[FIELD OF THE INVENTION AND DISCUSSION OF THE RELATED ART]

The present invention relates to a flat type fluorescent lamp, and more particularly, to a flat type fluorescent lamp that is applicable to a backlight and a flat light source of a liquid crystal display (LCD) device by obtaining high luminance and uniformly distributing quantity of light.

Recently, research of flat panel displays is being actively performed. Especially, the flat panel displays such as a liquid crystal display (LCD) device, a field emission display (FLD), an electro luminescence display (ELD) and a plasma display panel (PDP) have attracted considerable attention.

Among the flat panel displays, unlike light-emitting flat panel displays, the LCD device does not emit light in itself, so that it is unable to view a picture display in the LCD device where there is no light.

In order to solve this problem, a separate light source, a backlight is formed in a lower portion of an LCD panel to uniformly irradiate light into a display panel.

Such a backlight assembly is divided into a light-guiding plate type, a direct type, and a flat type. In the light-guiding plate type, a fluorescent lamp is provided at a lateral side of an LCD panel with a transparent light-guiding plate, to provide lights of the fluorescent lamp to an entire surface of the LCD panel. In the direct type, a fluorescent lamp is mounted in a lower portion of an LCD panel, and a light-diffusion plate is mounted between the fluorescent lamp and the LCD panel. In case of the flat type, a phosphor layer and an electrode are formed on lower and upper substrates, to obtain uniform light distribution.

In case of a large sized display panel, a light source irradiating uniform light is needed. In this respect, the flat type backlight assembly is most appropriate.

A related art flat type fluorescent lamp will be described with reference to the accompanying drawings.

FIG. 1 is a sectional view of the related art flat type fluorescent lamp. FIG. 2 is a sectional view illustrating problems of the related art flat type fluorescent lamp.

Generally, as shown in FIG. 1, the flat type fluorescent lamp includes a reflecting portion 1, a light-emitting portion 2, and a light-diffusion portion 4. In an LCD device, the LCD panel is formed above the light-diffusion portion 4.

Herein, the reflecting portion 1 reflects light emitted opposite to the LCD panel into the LCD panel.

The light-diffusion portion 4 is consisting of light-scattering means, in which light is scattered, to prevent a shape of a lamp from being reflected on the display panel. That is, it is very bright where there is the light-emitting portion of the lamp, while where it is relatively dark where there is no the light-emitting portion of the lamp. As a result, the shape of the lamp is reflected on the display panel. Accordingly, the light-scattering means 5 is used to prevent the shape of the lamp from being reflected on the display panel and to uniformly distribute quantity of light.

Such a light-scattering means 5 is consisting of one or more light-scattering medium layers. Sometimes, a sheet is formed on the light-scattering means to enhance display quality and improve characteristic of light.

If the display area increases, a light-emitting area of the backlight also increases. According to the increase of the light-emitting area, the light-scattering means should have a sufficient thickness.

If the light-scattering means doesn't have the sufficient thickness, as shown in FIG. 2, the light-scattering means subsides, so that quantity of light to the light-emitting area is unevenly distributed.

The light-emitting portion 2, unlike the related art direct type and the light-guiding plate type, includes a flat type lamp opposing the display panel of the LCD panel.

However, in the flat type, whole light-emitting area is not equally bright, actually some portions of the light-emitting area are partially dark.

It is caused by the following reasons. In the LCD panel above the backlight, a spacer cuts off a light path to maintain a constant distance between the upper and lower substrates. In a flat luminescent lamp, a barrier cuts off a light path to separate adjacent light-emitting paths from each other.

To obtain constant luminance on the whole light-emitting area, light-scattering medium layers have to be deposited while maintaining the predetermined distance from the light-emitting area.

[TECHNICAL TASKS TO BE ACHIEVED BY THE INVENTION]

However, the related art flat type fluorescent lamp has several problems.

As the size of the LCD panel increases, deformation of the light-scattering means occurs and the light path from the backlight is partially cut off, thereby unevenly distributing quantity of light. Therefore, several light-scattering medium layers having the predetermined thickness are required to obtain a thick light-scattering means, thereby preventing light from being unevenly distributed.

However, in this case, the luminance is low and deformation of the light-scattering means is caused due to its weight. Also, friction between the light-scattering

medium layers occurs. For this reason, foreign particles are generated, thereby increasing the manufacturing cost.

Accordingly, the present invention is directed to a flat type fluorescent lamp that substantially obviates one or more problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide a flat type fluorescent lamp in which a plurality of supporters are provided between a light-emitting portion and a light-scattering portion to uniformly maintain the distance between them regardless of a thickness of the light-scattering means, thereby obtaining high luminance and uniformly distributing quantity of light.

[PREFERRED EMBODIMENTS OF THE INVENTION]

To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a flat type fluorescent lamp according to the present invention includes a first substrate, a second substrate, a light-emitting layer formed between the first and second substrates, a plurality of supporters selectively deposited on the first substrate, and a light-scattering means formed maintaining a predetermined distance from the first substrate by the supporters.

That is, the flat type fluorescent lamp according to the present invention includes a plurality of supporters that maintain the predetermined distance between the light-emitting portion and the light-scattering means on the light-emitting area, to obtain a thin light-scattering means without deformation and subsiding of the light-scattering means.

Reference will now be made in detail to the preferred embodiments of the

present invention, examples of which are illustrated in the accompanying drawings.

FIG. 3A to FIG. 3B are sectional views illustrating a flat type fluorescent lamp according to the present invention. FIG. 4A to FIG. 4B are perspective views of the flat type fluorescent lamp according to the first embodiment of the present invention.

FIG. 5 illustrates supporters of the present invention. FIG. 6A to FIG. 6b are sectional views of the supporters according to the present invention. FIG. 7 illustrates a cap according to the present invention.

Meanwhile, FIG. 8 is a perspective view illustrating a flat type fluorescent lamp according to the second embodiment of the present invention.

First Embodiment

As shown in FIG. 3A, a flat type fluorescent lamp according to a first embodiment of the present invention includes a reflecting portion 11, a light-emitting portion 12, a light-diffusion portion 14, and supporters 13 formed between the light-emitting portion 12 and the light-diffusion portion 14. In a liquid crystal display (LCD) device, an LCD panel is formed above the light-diffusion portion 14.

Generally, the light-emitting portion 12 includes a first substrate 16, a second substrate 17 opposing the first substrate 16, a discharge path formed on the second substrate 17, a cathode electrode formed on one side of the discharge path, an opposing electrode formed on the other side of the discharge path to correspond to the cathode electrode, and a discharge gas 19 charged between the first and second substrates 16 and 17. A phosphor is deposited within the discharge path and in its inner wall to induce light-emission when the cathode electrode is electrically connected with the opposing electrode.

At this time, the first substrates 16 and 16a that serve as light-emitting areas

are formed of glass or heat-resistant material. The first substrate may be formed in a flat shape as shown in FIG. 3A, or in a curved shape having a plurality of supporters as shown in FIG. 3B.

The light-diffusion portion 14 includes a light-scattering means 15 on which one or more light-scattering medium layers are deposited. The light-scattering means diffuses light from the lower light-emitting portion 12 to the LCD panel.

The light-scattering means is formed to distribute light uniformly and to flatten the light-emitting area. To this end, the light-scattering means is formed by depositing light-scattering mediums of a plate material having a predetermined thickness to keep a constant distance from the first substrate 16.

The plurality of supporters 13 are formed on the first substrate 16 of the light-emitting portion to prevent the light-scattering means 15 from subsiding.

That is, as shown in FIG. 4A to 4B, separate supporters 13 are fixed on a predetermined portion of the first substrates 16 and 16a.

Accordingly, unlike the related art, it is unnecessary to deposit more light-scattering mediums on the first substrate for preventing the light-scattering means from subsiding. Even though the light-scattering mediums are formed thickly, the light-scattering means doesn't subside due to the supporters. As a result, uniform luminance can be obtained on the whole light-emitting area for a long time because the distance between the light-emitting area and the light-scattering means is constantly kept.

The shape of the supporters may be varied.

However, the flat luminescent lamp should have a solid shape to stably form the light-scattering mediums on an upper portion of the supporters and to maintain a specific height for arranging the light-scattering mediums on the light-emitting area of

the flat luminescent lamp at a constant distance.

For example, as shown in FIG. 5, the flat luminescent lamp has a pole shape having different upper and lower surfaces, a cylindrical or polygonal shaped pole having the same upper and lower surfaces, or a spherical shape having an upper surface cut with a curve.

Also, the supporters are formed of a transparent material or materials having characteristics of scattering light, so that light generated from the flat luminescent lamp passes through a portion adjoining lower surfaces of the supporters.

If light generated from the light-emitting area of the flat luminescent lamp doesn't pass through an inner portion of the supporters, the portion adjoining the supporters is partially dark in the light-scattering mediums deposited on the flat luminescent lamp.

Meanwhile, a cap is further provided to prevent the supporters and the light-scattering means from being damaged from mechanical friction and pressure between the supporters and the light-scattering means above the supporters.

The cap is a soft material, as shown in FIG. 6A, the cap 18 is covered on the plurality of supporters 13, or the cap is fixed on an upper portion of the supporters 13 as shown in FIG. 6B.

Various shapes may be made to the cap as shown in FIG. 7.

Second Embodiment

A flat type fluorescent lamp according to the second embodiment of the present invention includes a reflecting portion, a light-emitting portion and a light-diffusion portion. The light-emitting portion includes supporters to keep a constant distance between the light-emitting portion and the light-diffusion portion.

Referring to FIG. 8, the light-emitting portion will be described in detail.

The light-emitting portion includes a first substrate 116 providing a plurality of supporters 113 to form a single body, a second substrate 117 opposing the first substrate 116, a discharge path formed on the second substrate 117, a cathode electrode formed on one side of the discharge path, an opposing electrode on the other side of the discharge path to correspond to the cathode electrode, and a discharge gas 119 charged between the first and second substrates. A phosphor is deposited within the discharge path and in its inner wall to induce light-emission when the cathode electrode is electrically connected with the opposing electrode.

At this time, the first substrate 116 that serve as light-emitting areas are formed in a flat shape or in a curved shape having a plurality of supporters 113.

The first substrate 116 and supporters 113 are formed of a transparent material or a heat-resistant material having characteristic of scattering light.

Herein, the supporters 113 are formed to keep a distance between the light-scattering means deposited by one or more light-scattering medium layers and the first substrate of the light-emitting portion, so that it is possible to prevent the light-scattering means from subsiding.

Accordingly, light-scattering medium layers having a constant thickness can be deposited without regard to the increase of the light-emitting area.

Also, uniform luminance can be obtained on the whole light-emitting area because the distance between the light-emitting area and the light-scattering means is constantly kept.

Meanwhile, a cap is further provided to prevent the supporters and the light-scattering means from being damaged from mechanical friction and pressure between

the supporters and the light-scattering means above the supporters.

The cap is a soft material. The cap is covered on the plurality of supporters, or the cap is fixed on an upper portion of the supporters (referring to FIG 6A to 6B).

At this time, shapes of the supporters and cap can be varied (referring to FIG.5 to FIG. 7).

[ADVANTAGES OF THE INVENTION]

As mentioned above, the flat type luminescent lamp according to the present invention has the following advantages.

First, the supporters of the light-emitting area keep a constant distance between the light-emitting area and the light-scattering means, so that the whole light-emitting area can have the uniform luminance.

Also, the supporters support the light-scattering means, so that if the light-emitting area becomes large, it is possible to prevent the light-scattering means from subsiding to the lower portion without further depositing the light-scattering mediums.

That is, the light-scattering medium is thinly deposited without regard to increasing the light-emitting area. Therefore, it is possible to prevent luminance from being lowered, a structure of the light-scattering means from being changed due to the weight, and friction generated by depositing a plurality of light-scattering medium layers from occurring.

Accordingly, the flat type fluorescent lamp having a large size and high luminance can be provided, which is applicable to the flat light source of the LCD device.

The forgoing embodiments are merely exemplary and are not to be construed as limiting the present invention. The present teachings can be readily applied to other

types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is:

1. A flat type fluorescent lamp comprising:

first and second substrates;

a light-emitting layer formed between the first and second substrates;

a plurality of supporters selectively attached on the first substrate; and

a light-scattering means formed to have a predetermined distance from the first substrate by the supporters.

2. The flat type fluorescent lamp as claimed in claim 1, further comprising a reflecting plate on a lower portion of the second substrate.

3. The flat type fluorescent lamp as claimed in claim 1, wherein the supporters are formed of a transparent material or a material having characteristic of scattering light.

4. The flat type fluorescent lamp as claimed in claim 1, wherein the supporters may have a pole shape, of which upper and lower surfaces have different shapes and sizes from each other, may have a pole shape, of which upper and lower surfaces equal to each other, such as cylindrical and polygonal poles, or may have a lower surface of cylinder and polygonal shape, and a curved upper surface of a cut spherical shape.

5. The flat type fluorescent lamp as claimed in claim 1 further comprising a cap between the supporters and the light-scattering means.

6. The flat type fluorescent lamp as claimed in claim 5, wherein the cap is formed by covering the supporters, or by being attached to the upper portion of the supporters.

7. The flat type fluorescent lamp as claimed in claim 5, wherein the cap is formed of a soft material.

8. The flat type fluorescent lamp as claimed in claim 1, wherein the supporters are formed separately from the first substrate.

9. A flat type luminescent lamp comprising:

a first substrate provide with a plurality of supporters to form a single body;

a second substrate opposing the first substrate,

a light-emitting layer formed between the first and second substrates; and

a light-scattering means formed with a constant distance from the first substrate by the supporters.

FIG. 1

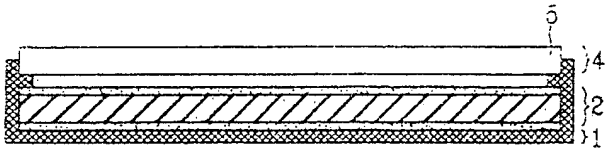

FIG. 2

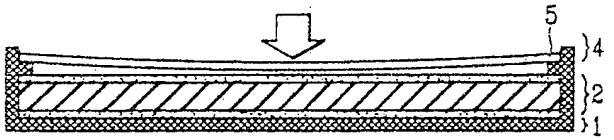

FIG. 3A

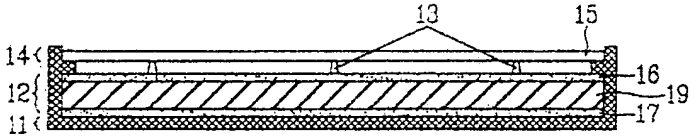

FIG. 3B

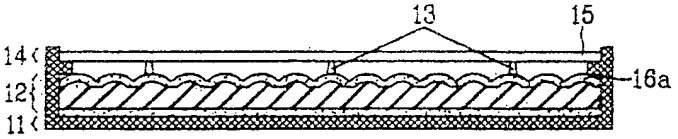

FIG. 4A

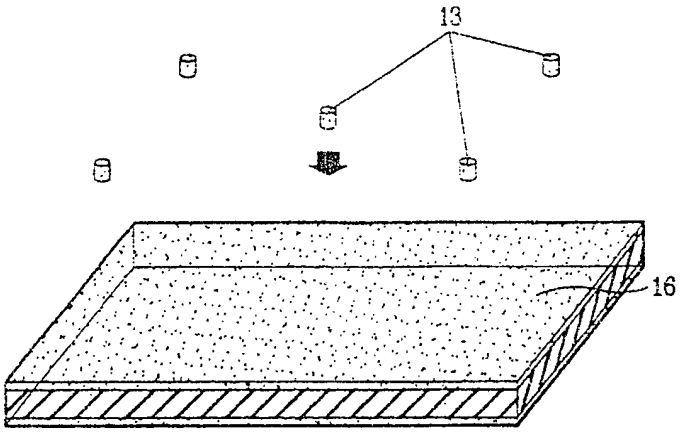

FIG. 4B

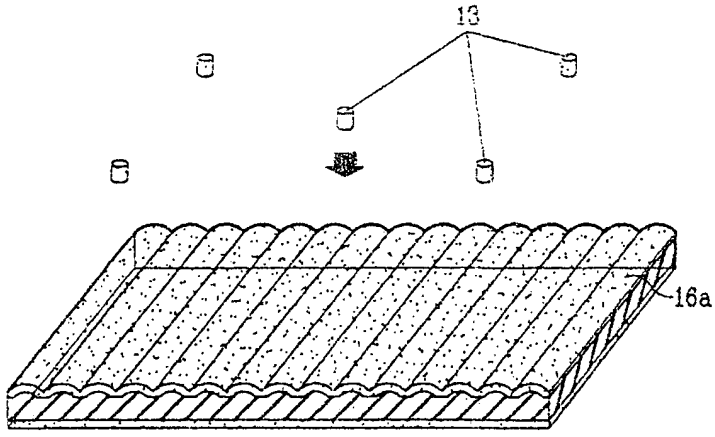

FIG. 5

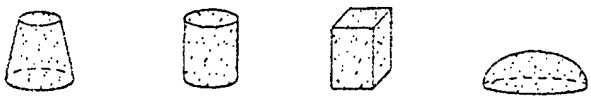

FIG. 6A

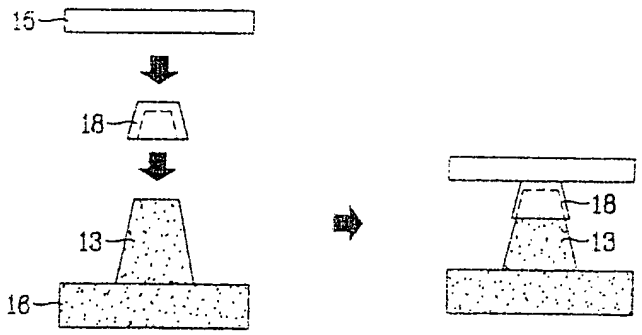

FIG. 6B

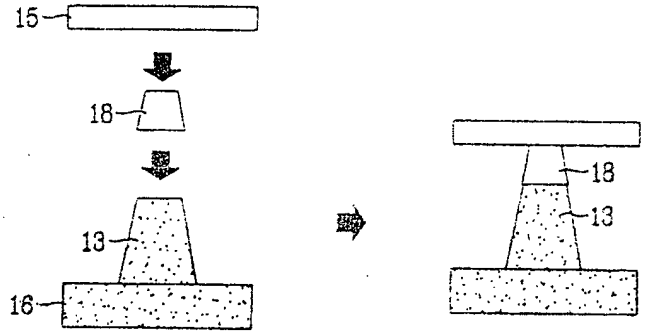

FIG. 7

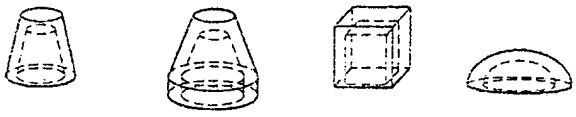

FIG. 8